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LETTER TO THE EDITOR

Bordetella hinzii: an Unusual Pathogen in Human Urinary Tract Infection

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A 37-year-old man with no prior medical history except chronic alcohol and tobacco consumption was admitted for fever at 38.5°C and abdominal pain starting 2 days before admission. Physical examination confirmed tenderness of the left flank with no other abnormalities. Blood testing found increased C-reactive protein (208 mg/liter), a high white blood cell count of 15×10^9/liter, acute renal failure with a creatinine level of 142 μmol/liter, and a negative blood culture. Tomodensitometry revealed a urinary lithiasis of 3 cm and 800 Hounsfield units' density in the left renal pelvis associated with major homolateral hydronephrosis, which confirmed a diagnosis of left obstructive pyelonephritis. Urine was drawn by bladder catheterization before starting antibiotherapy that included ceftriaxone and amikacin. A double J catheter was installed via endoscopic intervention, and renal pelvis urine was collected.

Urine samples from both bladder and renal pelvis showed pyuria with >700 leukocytes/mm^3. Nonspun pyelic urine showed Gram-negative short bacilli. Incubation for 24 h on chromogenic agar (Brilliance UTI agar, Oxoid, UK) at 37°C revealed 10^6 CFU of smooth and grayish colonies/ml. Matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS; Microflex LRF, Bruker Daltonics, Germany) identified *Bordetella hinzii* with an excellent score (2.45) using the MALDI Biotyper IVD library as already reported by Fabre et al. (1). Identification was confirmed by partial sequencing of the 16S rRNA gene that showed 99% identity with *B. hinzii*. Antimicrobial susceptibility testing was performed on Mueller-Hinton plates at 35 ± 2°C using the Etest technique (bioMérieux, France) (Table 1).

At day 2 from admission, the patient still presented fever at 39°C, so the antibiotherapy was switched to trimethoprim-sulfamethoxazole, given the low MIC. Apyrexia was obtained at day 4. Diabetes mellitus, hypogammaglobulinemia, and HIV screening were negative. The patient was discharged from the hospital at day 7 from admission with a total antibiotic course of 14 days with a favorable outcome.

B. hinzii is a small Gram-negative rod, which can be easily identified in culture after 24 h of incubation by using MALDI-TOF MS. It is considered as a pathogen in poultry's respiratory tract infections and was also isolated in rodents, but it has rarely been described in humans (1). To our knowledge, only 11 cases of human infections have been described, in addition to our case, involving pulmonary infection, bacteremia, endocarditis, chronic cholangitis, and peripancreatic and subcutaneous abscesses (2–8). No case of urinary tract infection has ever been reported. Urinary tropism of *B. hinzii* has not been described in animal infections either. Like our patient, three other immunocompetent individuals were affected, whereas in most cases predisposing factors are identified.

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TABLE 1 Antimicrobial drug susceptibility testing for *B. hinzii* using the Etest technique[a]

Antimicrobial drug	MIC (mg/liter)	Interpretation[b]	CASFM/EUCAST PK-PD breakpoint (mg/liter)	
			S ≤	R >
Amoxicillin	24	R	2	8
Amoxicillin/clavulanic acid	6	I	2	8
Piperacillin-tazobactam	1	S	4	16
Cefotaxime	>32	R	1	2
Ceftazidime	2	S	4	8
Imipenem	1.5	S	2	4
Meropenem	0.094	S	2	8
Gentamicin	2	S	2	4
Amikacin	8	S	8	16
Tobramycin	6	R	2	4
Ciprofloxacin	1	R	0.25	0.5
Levofloxacin	1	I	0.5	1
Trimethoprim-sulfamethoxazole	0.047	ND	ND	ND

[a]ND, not determined; R, resistant; S, susceptible; I, intermediate/susceptible with high dosage.
[b]Interpretation based on 2019 CASFM/EUCAST recommendations (9) using PK-PD (non-species related) breakpoints.

Our patient did not report any recent avian exposure that would have led to the contagion, but he notably had been breeding hens until 2 years before. A second hypothesis could be contamination through intake of insufficiently cooked infected poultry. Since long-lasting (up to 6 months) digestive carriage of *B. hinzii* has been described, chronic colonization should also be considered (6).

B. hinzii, for which EUCAST breakpoints have not been determined, was investigated for antimicrobial susceptibility using interpretation based on pharmacokinetic/pharmacodynamic (PK-PD) breakpoints, and the patient was probably treatable with ceftazidime, piperacillin-tazobactam, carbapenems, and aminoglycosides (except tobramycin) but not amoxicillin, ceftriaxone, and fluoroquinolones. First-line antibiotics for urinary tract infection are thus inefficient. In two previous cases, *B. hinzii* persisted in patients treated with trimethoprim-sulfamethoxazole, for which no PK-PD breakpoints were available, despite a low MIC (8, 9).

In conclusion, we report the first case of *B. hinzii* in human urinary tract infection. Microbiologists and clinicians should be aware of its implication in human infections in order to improve its diagnosis and management. Whether *B. hinzii* urinary presentation was secondary to the underlying lithiasis rather than a new pathogenicity requires further clinical and microbial investigations.

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